falling in showers of red hail—sometimes silently, sometimes with puffing and spluttering, varied with a roar like an angry bull; then a hush, followed by low moaning sobs.

"Some of these explosive forces have not built themselves chimneys, or, if they have, the lake has melted them, for they only betray their existence by suddenly bursting beneath the surface, like torpedoes, and tossing up red rockets.

"From the crag above I looked down upon a heaving, restless expanse of dull red almost entirely coated over with a silvery-grey scum, intersected by flowing rivers of red gold. The ceaseless movement beneath the surface kept up a glancing, gleaming play of white and red light, glistering like quicksilver in motion. Sometimes there came a swirling eddy, like the rush of a Highland stream.

"Then, again, the lava seemed to writhe and twist as if in agonised contortions, and then commenced a violent boiling and bubbling preparatory to its bursting into active fire-fountains. These play sometimes singly, sometimes alternately, sometimes a dozen burst into simultaneous action—like some marvellous display of rockets, flinging their fiery rain on every side, then dying away altogether, till the silvery coating spreads so evenly over the surface of the lake, that, but for the sulphureous exhalations and columns of smoke, it might almost be mistaken for some cool refreshing pool. In truth, the white vapours which play so eerily among those black rock-masses, might well be morning mists floating upward from a quiet mountain-tarn.

"This, however, is a delusion not to be cherished for long, especially towards sunset; for then the lake appears in its true glory, and all the wonderful chemical colours which were lost in the full light of day reveal themselves, the difference of the scene before and after sundown being that of any huge smelting works, as seen by day or by night, only magnified ten thousand times. Then the scale of colour varies from deepest chocolate, crimson, and scarlet, to orange, yellow, and primrose tints, and the silvery grey becomes tinged with pink and violet, while the solid rocks become ever more intense in their blackness; and the many-tinted sea plays around them, and dashes over them, and from time to time detaches some huge fragment, which falls with thunderous crash, reverberating from crag to crag.

"As the twilight faded away, my kind landlord rigged up blankets and lanterns to make me a snug sketching-point on the hill above this house, whence I could watch the glory undisturbed, and attempt to preserve notes in colour, which may give you and others an idea, however faint, of the amazing scene before me. A full moon added its cool, pure light to the lurid crimson glow, which was reflected on all the overhanging clouds, as well as on the column of white steam which for ever rises from the Halemaumau itself; and these clouds, being visible at a distance of many miles, must have declared plainly to our friends in Hilo that there was unusual activity at Kilauea."

The authoress of this work did not reach the summit crater of Mauna Loa, but at the end of her book she has collected from various sources a tolerably complete account of the great outbursts of 1880 and 1881.

The details given in this volume concerning the aboriginal inhabitants and their manners and customs—or rather, we should say, of the total want of the former and the utter "beastliness" of the latter—is interesting to the anthropologist. The judgments of the authoress upon historical questions are by no means unfair, and if she does not follow American writers in treating Capt. Cook's visit as an act of piracy and his fate as a just retribution, she clearly points out that the death of the great navigator followed as a natural consequence of the sad misunderstanding between the English and the natives. From the traditions of the natives we can now fill in many details of the story, and explain certain matters which Cook, in his total ignorance of the language of the people, could scarcely guess at. In this and in the subsequent transactions between the English under Capt. Vancouver, and the Hawaiians, it must be confessed that the natives were treated with but scant justice at the best, and in too many instances with wanton cruelty and tyranny.

The admirable illustrations of this work constitute one of its most valuable features. They are reproduced by the autotype process from the sketches of the authoress. The frontispiece, showing the low rounded dome of Mauna Loa, with Kilauea on its flanks, is one of the best representations of this most wonderful district which we remember to have met with. The indefatigable traveller who has now become an acknowledged favourite with the public may be heartily congratulated upon the success of this latest production of her busy pen and pencil.

OUR BOOK SHELF

Africana, or the Heart of Heathen Africa. By the Rev. Duff Macdonald. 2 vols. (London: Simpkin, Marshall, and Co., 1882.)

NOTWITHSTANDING a large amount of professional commonplace, this work rises considerably above the level of ordinary missionary productions. The author, who administered the Church of Scotland Mission at Blantyre, south of Lake Nyassa, during the years 1878-81, applied himself diligently to the study of his dusky flock, and has embodied his experiences chiefly in the first volume, devoted to the "native customs and beliefs." The second is occupied more specially with "mission life," and with the inevitable difficulties and troubles entailed upon the writer in consequence of his accepting a position which from the first he felt to be untenable.

Since his enforced retirement from active work, Mr. Macdonald has usefully occupied his time in arranging for publication some of the rich materials collected during his stormy missionary life. Most of these materials, being the result of original observation in a new field not yet disturbed by contact with Europeans, possess great scientific value. The descriptions of the native manners, customs, beliefs, superstitions, and traditions are as interesting as they are trustworthy, and they are supplemented by two appendixes, which may be specially commended to the attention of all lovers of folk-lore. These comprise numerous selections of original "native tales" and "cosmical tales," literally translated from the author's manuscript collection of tales, songs, enigmas, &c., the whole of which it is to be hoped he will be induced to publish. Some of the tales accounting for natural phenomena have at least the merit of brevity, as, for instance, that about the wind: "A great man had a daughter, and she said, 'Father, in this country I am hot, I sweat.' Then her father said, 'Come here, my child, I have pity, I will blow with my breath.' So he blew, and thence came wind" (i. 283).

It is sad to learn that trial by ordeal and torture is still as universally practised as it was in Europe during mediæval times. "When a Magololo suspects his wives, he places a stone in a jar of boiling water or oil, and orders them to fetch it up with their bare arms. He then judges of their guilt by the amount of injury they sustain. When a woman is thus convicted, he makes her confess who seduced her. In vain does the helpless creature protest that she is innocent. Notwithstanding that her arm is severely scalded, she is subjected to the most cruel

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torture by a kind of thumbscrew (*mbanilo*), which is applied to her head. A small tree is partly divided along the middle, the skull of the poor woman is inserted as if it were a wedge for splitting the tree still farther. Great pressure is exerted by forcing the halves of the tree together with the aid of pulleys" (i. 201). This of course has the wished-for effect, and as in the "processus inquisitorii," the wretched victims "dum propria sua confessione contra se pugnare coguntur sui ipsius proditores tortæ constituuntur." A. H. K.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

Natural Selection and Natural Theology

I READ with interest, in NATURE, vol. xxvii. p. 362, the reply made by Dr. Romanes to a letter of mine which, although not originally addressed to a scientific organ, found hospitable reception in your columns. It was not much out of place there, for it was essentially an inquiry whether certain inferences may or may not *scientifically* be drawn from certain premisses. I am not wholly without hope of making it clear that the criticisms which I ventured to bring forward are grounded in reason; and confining my rejoinder strictly to the issue joined, I may hope not to be long nor very tedious. Let me trust that no curtness of statement will imply any want of the great respect which I entertain for an able investigator and writer, whose view may be imperfectly apprehended, or may bear an interpretation I should accede to.

The issue is a narrow one, and there is no need to widen it. Dr. Romanes is understood to derive from scientific premisses the conclusion that evidence of design is not legitimately derivable from the structure and adaptations of plants and animals, and, more particularly, that the theory of natural selection has destroyed the evidence of special design in organic nature, so that now the facts of organic nature furnish no other and no better evidence of design than do the facts of inorganic nature.

The first of these conclusions was derived from the proposition that there is no point of logical contact between natural science and the idea of design, wherefore no inference can legitimately be carried from the facts of the one to the conceptions of the other. I suggested that the maintainer of that position could not consistently argue that a particular scientific theory has annihilated an inference admittedly beyond its logical range. The reply is that, "If a man believes that there is no logical connection between one thing and another, I do not understand why he should be deemed inconsistent because he endeavours to show the fictitious character of the logical connection which has been erroneously supposed to exist." But the point of the objection was that, while insisting that any inference from the one to the other was invalid from the nature of the case, he actually inferred that certain scientific facts and theories completely overthrow and destroy the theory of particular design in organic nature. This may be. Only one would think that whatever may be legitimately overthrown may be as legitimately supported.

Moreover, if I rightly understand, there was not long ago a legitimate ground of inference (whether scientific in the narrower sense or philosophical need not here be inquired) from organic nature to design. "For it would be proof positive of intelligent design if it could be shown that all species of plants and animals were created"; and therefore proof presumptive while the theory of special creation was accepted and probable. At least—and this is the point—the argument from structure and adaptation to design was then admissible and even cogent.

Now, from the scientific side, upon which we are standing, special creation means only that the forms were scientifically inexplicable, and to be taken as original; their adaptations to their surroundings and their relations of means to ends in themselves equally as primary endowments. And whatever evidences of intellectual origination these manifested, *were seen in the things themselves*, and we suppose are to be seen there still. The inference was not one from an intellectual originator to design in the organic world, but from marks and operations in the latter which indicated design to an intellectual originator. The inference to most minds was convincing; at least it was legitimate. The recognised laws and operations of nature—a better knowledge of which has destroyed so many crude notions—were not thought to interfere with it.

It used to be so, but we have changed all that. How?

First, by the declaration of the principle that the facts of organic nature, in all their multiplicity and variety, yield no other and no better indications of design than do any of the facts of inorganic nature. That is to say, a stratum no more than a structure, a crystal than a chrysalis, living things and their responses than lifeless things simply acted upon, things which are intelligible only when contemplated as means and ends, no more than things of which ends are predicable, if at all, only by remote implication. Not only is the one as good as the other, but any one is said to be as good as all. Because of "the universal prevalence of laws and sequences of cause and effect, . . . they are not really or logically strengthened by a mere enumeration of particular instances. . . . The so-called law of causation as a whole being known, and its universality recognised, its true argumentative value to the theory of theism is not influenced by the explicit formulation of any number of its specific cases."

Here "law of causation," or the way how something comes to pass, is mixed up with "evidence of design," or what it was for. And we are to conclude that the immense variety and multiplicity of adaptations of particular means which accomplish particular ends in organic nature bring no contributory and cumulative evidence as to there being any design in them. In palliation of the charge of "damnable iteration," to which the teleologists are thus exposed, it may be pleaded that, although possibly one good witness or one good observation may be as convincing as many for certifying a fact, surely the more and the more varied the better for proving an underlying intervention—of which the evidence must always be circumstantial, and the conclusion a judgment or belief.

The old belief that adaptation of means to ends in plants and animals gives evidence of intellectual origination, had not been seriously unsettled by the scientific belief of the universality of the law of causation. It remains to be seen whether it will survive the establishment of the belief that the forms in which these adaptations are recognised have themselves been slowly evolved and diversified in a way that is partly explained by the doctrine of natural selection; and this is the gist of the question.

Dr. Romanes thinks that we have, in natural selection, "a cause other than intelligence competent to produce the adaptations," one which supersedes intelligence by working gradually. For, "if the adaptations have been effected gradually, and by *the successive elimination of the more favourable variations by a process of natural causation*, we clearly have a totally different case to contemplate, and one which is destitute of any evidence of special design." "The progressive adaptations of structures to functions by such a purely physical cause as natural selection, when once clearly revealed, must destroy all special or particular *evidence* of design, even supposing such design to exist." This phrase, "such a purely physical cause as natural selection," and the preceding phrase italicised by its author as specially significant and as being its equivalent, show that the term is used in its strict sense. So the substitute for intelligence, that which is said to account for all the adaptations in living nature, is the successive destruction of the less favourable variations by natural causes, leaving the most favourable to survive! Here "we clearly have a totally different case to contemplate, and one which is destitute of any evidence of special design,"—equally destitute, one would say, of any pretensions to act as its substitute until it is explained how the physical destruction of a part should have set the rest into varying at all, into varying advantageously, and into varying into the very special ways they have done. Not till this, or something like it, is done, can natural selection pure and simple claim to give scientific explanation of the adaptations and the forms at whose birth it has assisted.

When I before insisted that "to make the purely physical explanation tenable it must be shown that natural selection scientifically accounts for the adaptation," and that it has not done this, that no reasons have been given why the organisms

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